

“A most  
VITALIZING  
measure”

*Clinical  
references on the  
use of ultraviolet  
and infrared therapy in  
general medical practice*

WITH COMPLIMENTS  
FROM  
**HANOVIA**  
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### **Editorial Note**

We wish to record our thanks to the physician who read the MS. of this brochure. Acknowledgements are also due to those practitioners who made its compilation possible by publishing the results they have gained with light treatment, to the number of fully 1,000 books and papers during the last six years. The majority of these have been scrutinized in compiling this brochure. We issue it as the latest in our series of professional handbooks on actinotherapy.

**ALPINE PRESS**

# “A most vitalizing measure”—

Clinical  
references on the use  
of Ultraviolet therapy  
in general practice.

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**“A MOST VITALIZING MEASURE—**

The title of this brochure contains a claim and a challenge. The claim is fully substantiated on clinical evidence. The description was given recently by a British post-graduate lecturer<sup>1</sup> :—

“The resistance of some patients may be so depressed that they are unable to eradicate the trouble in spite of . . . surgical help; in these cases the greatest attention must be paid to diet and care of bowels, iron and vitamin therapy are necessary and **the most vitalizing of all measures, general ultraviolet light therapy**, is given daily.”

Many other authorities express their opinion in similar terms:—

“Although toxins differ among themselves, yet the means which the body has of dealing with them, and with the bacteria which produce them, are always fundamentally the same. If we can discover an agent which is effective in activating, at least in some degree, these defensive mechanisms, then the diseases in which it is of value will obviously be numerous. An approach to such an agent we possess in ultraviolet rays.”<sup>2</sup>

“Light is of universal necessity to the life and well-being of cell development and sustenance. . . . Without light, proper metabolism is impossible, and when scientifically applied to suitably selected cases, it will do infinitely more than any other agent in the service of man to restore normal physiological conditions.”<sup>3</sup>

“The case for the use of ultraviolet light, in skilled hands, is proved. The technique has been mastered, the effects are sure, and the results are so satisfactory that the treatment is now thoroughly established and recognized.”<sup>4</sup>

It becomes the personal concern of every medical man, whether engaged in general practice, hospital attendance, or public health work, to ask himself whether he is making adequate use of this “most vitalizing agent.”

This brochure, a very brief and inadequate statement of the evidence, is written chiefly for the general practitioner, and emphasis has been given to those conditions which he would normally treat himself, and in which he would find actinotherapy of the greatest value.

The challenge is to the reader.

<sup>1</sup> Ingram, J. T., *Lancet*, April 13th, 1935. (*Quartz Lamp*, April, 1935).  
<sup>2</sup> Hernaman-Johnson, F. *Clin. Jnl.*, April 27th, 1927. (*Quartz Lamp*, October, 1934).  
<sup>3</sup> Humphris, F. H. “Artificial Sunlight,” 5th Edition, 1929.

<sup>4</sup> Lynham, J. E. A. *Proc. R. Soc. Med.*, January, 1929.

# GENERAL ULTRAVIOLET LIGHT THERAPY"

"Heliotherapy" signifies the treatment of disease by sunrays.  
 "Actinotherapy" denotes treatment from artificial sources producing the same groups of radiations as sunlight, i. e.:

## Definition.

GROUP	Wave-Length (A.U.)	Energy- quantum (Unit $10^{-12}$ ergs.)	Percentage generated by (a) Sun- light (Dorno)	(b) Sollux Lamp.	(c) Alpine Sun Lamp.
Ultraviolet rays					
(a) <i>Erythema-producing rays</i>	1,850-3,130	9.8-6.3	.03	—	18
(b) "Near Ultraviolet" rays	3-130-4,000	6.3-4.9	.97	0.2	10
"Visible" rays	4,000-8,000	4.9-2.5	57.8	7.6	20
Infrared rays	8,000-90,000	2.5-2.2	41.2	92.2	52

Of these three groups, the ultraviolet rays are most potent in their biological effects owing to their characteristic high energy. A scientist explains their action in terms of vital chemistry:-

"High energy is characteristic of the chemistry of every living organism, whether it be man, animal, or plant. . . Any substance is raised to a higher energy level on absorbing light, and so it is easy to understand how man can gain in tone and general health from sunlight. . . Experience has shown that the ultraviolet region of the spectrum is the most effective. . . I think we can find an explanation of this in the fact that human skin has a far greater absorption power towards ultraviolet than towards visible light and . . . it must be remembered that the amount of energy gained from ultraviolet light is far greater than it is with visible light. The fundamental principle seems to me to be one of raising the energy level of the whole system, whereby the patient gains resistance against ill-health and disease."<sup>1</sup>

The reactions of the human organism to these rays are multifarious and far-reaching. That they activate Vitamin D in the cholesterol of the body is familiar knowledge, but this is only one of many complex reactions. "Just as the blood content of cholesterol increases after ultraviolet irradiation, so also does its content of the amino-acids tyrosine and cystine. Now thyroxine and adrenalin are chemical derivatives of tyrosine, which in union with cystine begets insulin."<sup>2</sup>

A practical understanding is best obtained from a survey of the outstanding clinical applications. In the following pages some of these are reviewed in the actual words of recent writers. With few if any exceptions, all these authorities are users of Hanovia apparatus.

There is no doubt that radiant energy stimulates nerve endings through a photochemical reaction, the stimulation being mediated by receptors, not necessarily structurally defined, but sensitive to photochemical change in the substance with which they are in contact. The effect is therefore due, not to the energy directly, but to the chemical changes which it causes, these changes involving the formation of a substance or of substances which act as inner stimuli.<sup>3</sup>

## High-energy Chemistry.

## Blood Reactions.

<sup>1</sup> Baly, E. C. C. *Brit. Jnl. Actinotherapy*, October, 1927. <sup>2</sup> Llewellyn, R. L. *J. Medical Press*, August 15th, 1934. <sup>3</sup> Laurens, Henry, Ph. D. *The Chemical Catalog Co., Inc.*, 1933.

**"INTERNAL MEDICINE"****Anemia  
Secondary.**

Hobert, 1923 (*Klinische Wochenschrift*) bled mice and found a stimulation of the hematopoietic organs when the mice were exposed to ultraviolet radiation (10 to 11 days for complete restoration compared with 14 days when kept in daylight).

Tixier (*Journal de Radiol.*) found ultraviolet radiation effectual in hemorrhagic anemia in adults.

Bannerman, 1927 (*Strahlen Therapy*) in studying non-tuberculosis orthopedic cases found that, although the response of the red cells during the irradiation period may vary, there is a greater or less increase in the count during the post-irradiation period and the effects are too pronounced and lasting to be due to any other factor than the radiation.

Laurens & Myerson, 1931 (*Jour. of Nutrition*), studied the effect of ultra-violet on dogs made anemic by hemorrhage. The most pronounced effects were on the number of erythrocytes and reticulocytes with no corresponding change in hemoglobin formation. Irradiation was followed by an increase in red cells. The rise usually began immediately or within a few days after the first exposure.

"The majority of the cases treated were either children who were anemic, particularly the type following upon the occurrence of an infectious disease or other debilitating illness, or children suffering from debility, a vague term signifying rather a tendency to disease than any actual disease, but characterized by such symptoms as fitful appetite, poor sleep, nerviness or malnutrition. After a course of ray treatment, such a case usually goes on improving without further treatment." <sup>1</sup>

**Convales-  
cence.**

"In debility after measles, whooping cough, influenza, and in post-operative weakness the improvement was usually very marked." <sup>2</sup>

"One outstanding feature was the general feeling of high spirits amongst the patients whilst undergoing the course, and often a refractory troublesome child underwent a perfect transformation as a result. It has been an excellent investment, not only in reducing the usual period of convalescence and the severity of complications even of mild scarlet fever, but also in turning out contented patients to more contented parents." <sup>3</sup>

**Post-  
operative  
care.**

"In post-operative treatment, all cases, regardless of the site of the treatment, are given infrared and ultraviolet radiation. . . On comparing records, I find that my patients are spending approximately three and one-half days less in the hospital than they did before I used physiotherapy as a routine post-operative treatment." <sup>4</sup>

"The work of these pioneers has opened up new fields for the surgeon to explore. The fact that the highest incidence of infected wounds comes following our long winter months of sunless skies, when the body resistance is at its lowest point, suggests the great importance of ultraviolet radiation in maintaining our health. I have

<sup>1</sup> Herd, H. Report of S.M.O. Manchester, 1932 (*Quartz Lamp*, October, 1933.) <sup>2</sup> Wilkinson, J. B. Report of M.O.H. Oldham, 1929. (*Quartz Lamp*, October, 1931.) <sup>3</sup> Dawson, G. A. Report of M.O.H. Darlington, 1929. (*Quartz Lamp*, October, 1931.) <sup>4</sup> Miller, H. C. *Arch. Phys. Therapy*, February, 1932. (*Quartz Lamp*, April, 1932.)

found that the quickest "pick me up" after an operation is not the old fashioned tonic but a series of ultraviolet light treatments.

"Many patients who have had to spend weeks in bed and would ordinarily return home pale, underweight and weak, now leave the hospital looking like their more fortunate neighbors who have been sojourning in Florida. The psychologic effect alone means a great deal in reducing the time of post-operative convalescence."<sup>1</sup>

"From an intimate study of almost 3,000 cases of all types of colitis, I am convinced that a large number are associated with, if not due to endocrine disturbances. . . The basic treatment is ultraviolet radiation, and to this is added infrared radiation. When colitis is due to vitamin deficiency good results may be expected. Another established fact is that in some way or other ultraviolet radiation activates the deficient endocrine glands and thus tends to stabilize the endocrine system in which co-ordination has been disturbed. To one who has used ultraviolet extensively examples are countless of increased weight, the disappearance of weakness, the building up of resistance against infection, relief of insomnia, improvement of appetite, most of which is without doubt due to its action on some part of the endocrine system and hence applicable to all forms of colitis of neurogenic origin and extremely useful in that almost hopeless of all colitides—the tubercular type. . . The abdominal surface is first exposed for one-half hour to the infrared lamp. This is followed by increasing dosage front and back with ultraviolet radiation, using the mercury vapour lamp."<sup>2</sup>

From his investigation of fifty cases of Gonococcal Cervicitis, Dr. M. Abramson of the University of Minnesota reports that ultraviolet therapy administered twice weekly for three-minute periods for an average of twenty treatments will be "an extremely valuable addition to our gynecological armamentarium" and a more effective means of therapy than topical application of antiseptic drugs.<sup>3</sup>

"The beneficial effect of both natural and artificial light treatment in cases of tuberculous arthritis is well known, and is explained almost entirely through the constitutional effects of the irradiation and of the other factors—elevation, mountain air, rest and relaxation. The good results reported in chronic arthritis by sojourns in heliotherapy resorts in Arizona and Egypt, as well as by artificial radiation, can undoubtedly be explained at least in part by the above considerations. The rationale of light therapy may be based on three considerations: first, the general tonic effects of radiation, especially in patients with asthenic constitution and rheumatoid arthritis; second, the recent research work of many investigators showing that chemical, thermal and other "insults" of the skin provoke or increase the defensive power of the body partly by a direct effect on improving immunity and partly by stimulating the immunizing mechanism through the absorption of the products of tissue damage, for ultraviolet irradiation, causing a varying degree of dermatitis, acts like foreign protein therapy; third, the direct thermal effect of the infrared rays."<sup>4</sup>

Colitis.

Cervicitis.

Arthritis

<sup>1</sup> Jackson, A. S. *Archives of Physical Therapy, X-Ray, Radium*, June, 1935. <sup>2</sup> Levy, L. H. *Physical Therapeutics*, May, 1929. <sup>3</sup> Abramson, Milton, *Archives of Physical Therapy, X-Ray, Radium*, February, 1935.  
<sup>4</sup> Kovacs, Richard. *Med. Jnl. and Record*, November 15, 1933.

## EFFECTS ON METABOLISM

"In rickets, both experimental and infantile, it has been shown that the beneficial action of radiant energy is not limited to the rachitic process. It supplies something which makes metabolism more efficient, causing the organism to operate with increased economy (Laurens). Rollier's explanation of the increased metabolism of the improvement in general health and of the increased resistance to disease following sun baths is that the dilation of the capillaries increasing the circulation induces a continuous tonic action on the sensory nerve terminals in the skin, thus restoring tone to muscles and promoting physiological processes throughout the body."

"There is fairly uniform agreement as to the clinical benefits of general irradiation in improving appetite and sleep, increasing assimilation and elimination, deepening and slowing of respiration. Marked mental stimulation and analgesic effect on painful areas are explained by a reflex action on both central and peripheral nervous system. . . Prenatal irradiation of the mother and also irradiation of the nursing mother has a definite preventative influence on rickets. Infantile tetany or spasmophilia and the minor degrees of calcium and phosphorus deficiency in children and osteomalacia in pregnant or nursing women also respond most favorably."<sup>1</sup>

## Rickets.

"The new knowledge of Vitamin D has taught us that an infant has a two-fold source of this vitamin, one obtained from the diet, and the other from the manufacture of the vitamin in his skin after he has been exposed to ultraviolet light. . . In the present series one infant (Case 3) entirely breast-fed . . . was treated successfully by exposing the mother to ultraviolet light."<sup>2</sup>

"Rickets is a disease which responds so promptly and regularly to ultraviolet irradiation that results following exposure to a source of known strength can be predicted. Recovery is so constant that healing of the disease has the regularity of a chemical reaction."<sup>3</sup>

"Levick was impressed with the fact that children suffering from acute rickets exhibited the symptoms of neurasthenia and that these symptoms were among the first to clear up under artificial light treatment. Acting on this observation he treated some cases of neurasthenia in adults with great success and was inclined to regard neurasthenia in the adult as a manifestation of light starvation."<sup>4</sup>

In their relation to Calcium and Phosphorus metabolism the Council on Pharmacy and Chemistry of the A. M. A. has pointed out the difference between Vitamin D preparations and direct exposure of the skin to ultraviolet as follows:

<sup>1</sup> Kovacs, R. *Electrotherapy and Light Therapy*, 1935. <sup>2</sup> Sheldon, W. *Lancet*, 19th January, 1935. <sup>3</sup> Maughan, G. H. and D'c, J. A. *Brit. Jnl. Actinotherapy*, March, 1930. <sup>4</sup> Mayer, Edgar. *Clinical Application of Sunlight and Artificial Radiation*, Williams & Wilkins Co. (1926).

**"Allowable Claims.—**1. Vitamin D is recognized as a specific in the treatment of infantile rickets, spasmophilia and osteomalacia, diseases which are manifestations of abnormal calcium and phosphorus metabolism. Vitamin D is valuable in the preventive as well as curative treatment of these diseases. Complications such as certain renal diseases or glandular malfunction may preclude normal response to vitamin D therapy. During acute infections, especially of the gastrointestinal tract, vitamin D may prove ineffective because poorly absorbed."

"2. Direct exposure of the skin to ultraviolet light from the sun or from artificial sources results in the formation of vitamin D within the organism but the Council cannot recognize statements or implications that vitamin D has all beneficial effects of exposure to sunshine." 1

"Cormac, H. D., *Journal of Mental Science*, 1929, believes that actinotherapy is a necessary adjunct to the treatment of mental cases. He employs it as a routine for convalescent patients and believes their recovery is thereby hastened. The excellent results obtained in dementia *præcox* of the simple type, and also in hebephrenia after the acute phase has passed are emphasized. It is Cormac's opinion that every psychopathic hospital should be equipped with ultraviolet ray apparatus for the treatment of mental disorders, as well as for the many physical diseases that are ameliorated by its use. Opportunity would also thus be given for more extensive study of this subject, which would give scope for wider research into its physiological relation to the psychoses and the nervous system generally." 2

"That the pregnant woman must vomit is the theory accepted by many physicians and by most of the laity. Indifference to hyperemesis, taking it as a natural consequence of gestation, has led to many unfortunate and distressingly serious complications. . . . The nausea and vomiting of pregnancy should never be looked upon as a purely physiologic condition, but should be treated as pathology from its inception. Four years ago our clinic began the use of ultraviolet irradiation in nausea and vomiting of pregnancy. Gradually ultraviolet irradiation has come to be the thing around which we center our treatment of hyperemesis and associated conditions." 3

The toxæmias of pregnancy, and complications such as eclampsia, are due to deficiency of essential substances, among which the most important is calcium. The beneficial effects of ultraviolet rays are due, *inter alia*, to their action in fixing calcium in the body. "The adults treated included expectant mothers suffering from insomnia, debility and extreme depression. The improvement in the mental attitude of such patients was one of the most marked features of the treatment." 4

"In excessive vomiting, beneficial effects were soon apparent. Almost without exception after three or four doses the patients were

Mental  
Cases.

Ante-natal  
Cases.

<sup>1</sup> *A. M. A. Journal*, May 16, 1936.   <sup>2</sup> Laurens, H. *Physiological Effects of Radiant Energy*. Chemical Catalog Co. (1933).   <sup>3</sup> Holman, H. D. *Brit. Jnl. Actinotherapy*, February, 1930.   <sup>4</sup> Clark, R. V. *Reports of M.O.H. Manchester*, 1929 ff.

either not sick or only very slightly so, and they stated they felt better.”<sup>1</sup>

Improved Lactation.

“Adults referred for treatment included nursing mothers whose breast milk was beginning to fail, and the results here were found to be satisfactory in almost 50 per cent. of the cases.”<sup>2</sup>

“‘Artificial sunlight,’ in the case of the mother, has a tonic influence, and lactation can be carried on when otherwise it shows signs of failing.”<sup>3</sup>

Vitamin C.

It has been shown that pigment in the skin serves as a depot for storage or as an anchorage for Vitamin C and that Vitamin C does not remain in the skin except in association with pigment.<sup>4</sup>

Rygh of Uppsala has shown that Vitamin C can be synthesized by the action of ultraviolet on narcotine.<sup>5</sup>

<sup>1</sup> Gibbs, N. in Report of M.O.H. Cardiff, 1931. <sup>2</sup> Clark, R. V. Report of M.O.H. Manchester, 1928. <sup>3</sup> Trotter, G. C. *Brit. Jnl. Actinotherapy*, July, 1927. <sup>4</sup> Cornbleet, Theodore and Pace, E. R., A. M. A. Scientific Exhibit, Kansas City, 1936. <sup>5</sup> Hess, Alfred F., Recent Advances in Knowledge of Scurvy, *A. M. A. Jnl.*, April 23rd, 1932.

# DISEASES OF THE RESPIRATORY SYSTEM

Cases are uncertain in their response to ultraviolet irradiation, yet a sufficiently high proportion of patients are so benefited that the treatment, which never has any adverse effects, is definitely worth a trial in all instances. Here are a few clinical records:—

Asthma.

"Ultraviolet radiation, with the mercury vapour lamp, was given eighteen patients, and these were unanimous in stating that their health generally was improved. . . Ultraviolet light gave the highest percentage of improvement."<sup>1</sup>

After detailing case histories of patients who remain free from attacks, Dr. A. Bryce<sup>2</sup> writes: "the ultraviolet light treatment of asthma counters the various factors in its causation, and is valuable, not only for cure, but also for prophylaxis."

"Obviously we must not expect from ultraviolet irradiation a definite cure of every asthmatic. But in the majority of cases radiation gives either a very decided improvement or a relief which is not to be despised."<sup>3</sup>

The following caution deserves emphasis: "It should, and MUST, be thoroughly understood by all who would make use of actinotherapy as a therapeutic measure in asthma (and the same dictum applies to other diseases where the remedy is indicated) that there is such a thing as skill. . . In many cases of asthma, actinotherapy alone, if used in the manner indicated, is sufficient to bring about rapid and striking benefit, and, not seldom, entire cessation of paroxysmal attacks. All 'rule of thumb' methods of exposure, however, are to be avoided."<sup>4</sup>

Bronchial  
Asthma.

"In children, by suitable exposure to the rays of a mercury vapour lamp, attacks may be reduced from daily occurrence to an incidence of one in two to three months, with coincident improvement in health."<sup>5</sup>

Bronchial  
Asthma.

In Vienna, Drs. Kowarschik and Wellisch<sup>6</sup> and at Bad Ems Dr. Evers<sup>7</sup> practice as routine treatment of bronchial asthma cases regional ultraviolet irradiation of the thorax combined with diathermy. Their records cover many hundreds of cases treated with success. In acute bronchitis, pleurisy and pneumonia, infrared rays are of great value (see page 17).

Whooping  
Cough.

It is bewildering to find that although every practitioner who has adopted actinotherapy for this distressing and killing malady reports consistent success, yet the majority of the British medical profession take no cognizance of it.

Whooping  
Cough.

"We have had opportunities of treating a large number of cases of whooping cough by means of ultraviolet radiation and the results have been uniformly successful."<sup>8</sup>

<sup>1</sup> Una Ledingham in Report of the Asthma Research Council, 1930. <sup>2</sup> Brit. Med. Jnl., March 19th, 1927.  
<sup>3</sup> E. & H. Biancani. Brit. Jnl. Actinotherapy, September, 1927. <sup>4</sup> P. Hall: "Asthma and Its Treatment" (1930). <sup>5</sup> F. Hernaman-Johnson, Lancet, Dec. 4th, 1932. <sup>6</sup> Brit. Jnl. Phys. Med., August, 1931. <sup>7</sup> Quartz Lamp, January, 1934. <sup>8</sup> E. H. & W. K. Russell: "Ultra-Violet Radiation" (1928).

"During 1926-29 I treated with ultraviolet rays from a mercury vapour lamp such cases as I met with in my practice and also at the Uxbridge Joint Isolation Hospital. . . . I should not now think of treating any case of whooping cough, free from complications, by any other means." <sup>1</sup>

### Colds and Chronic Bronchitis.

Drs. G. Maughan and D. F. Smiley, at Cornell University, have for three years been giving the "cold susceptible" students tonic ultraviolet baths twice weekly from October to May, and state that the incidence of colds is reduced by 46.7 per cent. compared with controls.<sup>2</sup>

"Chronic catarrhal conditions showed very definite improvement and remained free from colds for a longer period than ever before." <sup>3</sup>

"Reports from parents or guardians leave little doubt as to its value in warding off colds and keeping the child free from bronchial complications." <sup>4</sup>

<sup>1</sup> A. J. Turner, *Practitioner*, January, 1932. <sup>2</sup> *New York State Med. Jnl.*, December 15th, 1932. <sup>3</sup> Annis, E. G. Report of M.O.H. Greenwich, 1930. (*Quartz Lamp*, April, 1932.) <sup>4</sup> Smith, H. E. Report of Administrative M.O. Dunfermline, 1932. (*Quartz Lamp*, October, 1933.)

# SKIN CONDITIONS

"We further conclude on the basis of our clinical experience with the newer methods of therapy as well as on the basis of the present study that the treatment of erysipelas by ultraviolet irradiation may be advocated as a universally applicable method; (a) it is readily available in practically all communities and is devoid of danger, as contrasted with roentgen irradiation and antitoxin; (b) it usually requires only one treatment, but the treatment may be repeated several times without the least danger; (c) it is inexpensive; (d) the results are somewhat better in our hands than those of any other method of therapy."<sup>1</sup>

## Erysipelas.

"That ultraviolet therapy is equal if not superior to serum therapy is, we feel, very evident. Aside from the economic issue, which is an important one (cost of serums), the end results, governed by the quicker response to treatment and the fewer complications, make ultraviolet therapy for facial erysipelas quite distinctive, and, indeed, the method of choice."<sup>2</sup>

Reporting the results of fifty-one cases successfully treated with the mercury vapour lamp at the Edinburgh City Hospital, Dr. J. M. Davidson<sup>3</sup> states "The treatment of erysipelas, particularly the early cases, by ultraviolet light appeared to give better results than other methods in use. . . The method is easily applied, usually available, devoid of danger, cleanly and inexpensive."

In the early stages of a boil or carbuncle, one intensive focal irradiation with the quartz lamp will usually abort the pathological process. "Heavy doses of the rays cause healing at a very much more rapid rate than by any other known method."<sup>4</sup> "In the treatment of boils, carbuncles, and septic processes generally, infrared irradiation should be the treatment of choice. . . Local treatment should be combined with focal ultraviolet irradiation, and also general ultraviolet irradiation in order to increase the bactericidal power of the blood and the general resisting powers."<sup>5</sup>

## Boils.

"Burns and scalds heal painlessly and with excellent cosmetic results under local irradiation; the supple character and small amount of scar tissue are sequels to the surprisingly rapid healing which is a usual result."<sup>6</sup> Patients are freed from pain, so are rested and sleep well from the start. There is no interference with the vitality of the undamaged cells at the margin of the wound, which thus respond to mild repeated irradiation. Epithelium grows more rapidly and the lesion assumes a healthy aspect in less time than by any other method.

## Burns and Scalds.

Varicose ulcers of the leg and trophic ulcers dependent upon poor peripheral circulation are stimulated by the active hyperemia produced by erythema exposures. The infection which is present in many of these lesions at the beginning of treatment soon disappears under the

## Varicose Ulcers.

<sup>1</sup> Ude, W. H. and Platon, E. S., *Jnl. A. M. A.*, July, 1930. <sup>2</sup> Lavender, H. J. and Goldman, L., *Jnl. A.M.A.*, August 10th, 1935. <sup>3</sup> Davidson, J. M., *Brit. Med. Jnl.*, May 21st, 1932. <sup>4</sup> Castle, W. F., *Brit. Med. Jnl.*, December 26th, 1925. <sup>5</sup> Troup, W. A., *Brit. Med. Jnl.*, August 25th, 1924. <sup>6</sup> Weinbren, M., *Brit. Jnl. Radiology*, October, 1929.

ultraviolet therapy. The resulting scar is pliable and firm, and the thickened eczematous skin around the lesion becomes normal. The use of ultraviolet radiation in erythema doses daily for three or four weeks will enhance the chances of success in lesions where skin grafting is undertaken.<sup>1</sup>

### Impetigo.

"I was taught as a student that *impetigo contagiosa* was an eruption which usually ran its course in a period of three weeks. . . More recently we have, however, in the ultraviolet light treatment a very efficient method of cure. Three or four applications of ultraviolet light in the course of a week or ten days will usually cure an *impetigo contagiosa* at whatever stage."<sup>2</sup>

### Adenoma Sebaceum.

Adenoma sebaceum is successfully treated by third degree reactions of ultraviolet light. The papular type responds better than the telangiectatic type, but both are improved and sometimes cured by repeated treatments similar to those applied to *nevus flammeus*.<sup>3</sup>

### Eczema.

"Those of us who specialize in light therapy . . treat many cases of chronic eczema of all types which have defied the efforts not only of the general practitioner, but also of the skin specialist. . . I have just completed, with success, the treatment of a patient who had suffered from chronic eczema intermittently for thirty years."<sup>4</sup>

"In some cases chronic and unyielding to other forms of treatment for years they yielded under treatment by artificial sunlight."<sup>5</sup>

### Psoriasis.

"Ultraviolet rays are most useful in the acute types of psoriasis as well as in the superficial types in folds. Some believe that their use at intervals, after involution of an eruption by other measures such as X-rays, may materially prevent recurrences. The exposures should be given twice weekly and to the point of obtaining definite reactions with pigmentations. This method is not quite so effective as that with the X-rays but is free from possibility of dangerous sequelae. A method that has been particularly effective is the combined use of 1 to 5 per cent coal tar ointment with ultraviolet rays. The ointment is spread on the skin about one-eighth inch thick. At daily intervals the excess ointment is wiped off with olive oil, a thin film of the crude coal tar being left. Irradiation with a mercury quartz lamp is then carried out. This is said to be particularly effective in exfoliative dermatitis following psoriasis. This form of treatment should be carried out only in a hospital or where the patient can be closely supervised but in modified form it can be used for ambulatory patients."<sup>6</sup>

### Ringworm.

The diagnosis of ringworm (*trichophyton microsporum*) by its characteristic fluorescence under filtered ultraviolet rays is now standard procedure in medicine.<sup>7</sup> It is not so well known that the infection itself succumbs readily to powerful local irradiation, a procedure free from danger and discomfort of X-ray or thallium acetate therapy.

<sup>1</sup> Andrews, George C., Diseases of the Skin, 1931. <sup>2</sup> Adamson, H. G., *Med. Press*, May 25th, 1927. <sup>3</sup> Andrews, George C., Diseases of the Skin, 1931. <sup>4</sup> Troup, W. A., *Brit. Med. Jnl.*, November 19th, 1932. <sup>5</sup> Lobban, G. M. D., Report of the S.M.O., Colne, 1932. <sup>6</sup> The Therapy of the Cook County Hospital, Edited by Bernard Fautus, M. D., *A. M. A. Jnl.*, July 13th, 1935. <sup>7</sup> Newman, Sir George. Report of Chief M.O. to Board of Education, 1933.

"A series of cases have been treated by ultraviolet radiation with great success. The blebs soon dry and disappear, and the infant improves in general condition. The mercury vapour lamp was used twice weekly."<sup>1</sup>

Generalized ultraviolet radiation in tonic doses is, however, a valuable means of increasing the patient's resistance in both impetigo and pyoderma. In infants and children affected by these diseases, tonic exposures should be given daily. I have often cured infants afflicted with apparently hopeless furunculosis and pemphigus neonatorum by this simple form of therapy. In ecthyma similar treatment, together with the production of second degree reactions upon the affected area, is the method of choice. Russell calls attention to ultraviolet therapy in ischiorectal abscess.<sup>2</sup>

"During the past five years I have treated six cases of alopecia totalis with ultraviolet rays; four of these were men and two were women. The male patients were between the ages of 32 and 54 years, and had had complete alopecia for over six years before they started treatment with me. They have responded very well to treatment and have now recovered growth of hair. . . I have found that general irradiation of the skin of the body following the technique of short ultraviolet ray therapy is of greater importance than just the local treatment to the scalp and the other hair-growing areas."<sup>3</sup>

"Several workers were able to obtain gratifying results in the treatment of suppurating, non-tuberculous open wounds with quartz-light irradiations. Hyperemia followed, granulations were stimulated, bacteria destroyed, and cicatrization ensued."<sup>4</sup>

Pemphigus  
Neonatorum.

Pyoderma.

Alopecia.

Wounds.

<sup>1</sup> Gregorson, A. W., *Lancet*, April 7th, 1928. <sup>2</sup> Andrews, George C., Diseases of the Skin, 1931. <sup>3</sup> Edinnow, A., *Brit. Med. Jnl.*, November 29th, 1930. <sup>4</sup> Clinical Application of Sunlight and Artificial Radiation. Mayer, Edgar, M. D. The Williams & Wilkins Co. (1926).

## THE NERVOUS SYSTEM

"There is no doubt that radiant energy stimulates nerve endings through a photochemical reaction, the stimulation being mediated by receptors, not necessarily structurally defined, but sensitive to photochemical change in the substance with which they are in contact. The effect is therefore due, not to the energy directly, but to the chemical changes which it causes, these changes involving the formation of a substance or of substances which act as inner stimuli."<sup>1</sup>

"Very good results were obtained in the case of nervous children; although results varied, the nervous stability of the children was improved, and in some cases the improvement was marked."<sup>2</sup>

"Levick was impressed with the fact that children suffering from acute rickets exhibited the symptoms of neurasthenia and that these symptoms were among the first to clear up under artificial light treatment. Acting on this observation, he treated some cases of neurasthenia in adults with great success and was inclined to regard neurasthenia in the adult as a manifestation of light starvation."<sup>3</sup>

### Neurasthenia.

"We have treated many cases of neurasthenia, and all except two have benefited greatly. The most satisfactory response to ultraviolet irradiation is obtained in cases of the apathetic type, and when the patients are anaemic and emaciated."<sup>4</sup> "Whatever may be the actual explanation, there are few treatments for which the neurasthenic will be so profoundly grateful as ultraviolet radiation."<sup>5</sup>

### Lumbago and Sciatica.

Quick and lasting relief of a lumbago attack is obtained from a regional dose of ultraviolet rays. Dr. J. Lepsky<sup>6</sup> of the Soviet Medical Service says of 1,152 cases:—"The sum total of results obtained by means of local erythema doses justifies us in concluding that irradiation can be considered as a method of choice. Apart from its excellent therapeutic effects, this method possesses still further advantages:—the rapidity of the therapeutic results; the cheapness of this treatment; the decided shortening of the working incapacity period."

Other forms of nervous pain likewise benefit greatly from ultraviolet radiation, suited to the case; migraine, tic doloreux, and periodic headaches are quoted by Dr. F. Humphris. Dr. F. Talbot uses general light baths to clear up chronic neuralgia after dental surgery.

<sup>1</sup> The Physiological Effects of Radiant Energy. Laurens, Henry, M.D. The Chemical Catalog Co., Inc. (1933.)  
<sup>2</sup> Brown, G. A. In Report of M.O.H., Glasgow, 1930. <sup>3</sup> Clinical Application of Sunlight and Artificial Radiation. Mayer, Edgar, M.D. The Williams & Wilkins Co. (1926). <sup>4</sup> Russell and Russell, "Ultra-Violet Radiation and Actinotherapy" (3rd edition), 1928. <sup>5</sup> Humphris, F. H. *Brit Jnl. Phys. Med.*, July, 1934.  
<sup>6</sup> "Ultra-Violett-Behandlung der Ischias," 1932.

## TUBERCULOSIS

King Edward the Seventh well said of tuberculosis, "If preventable, why not prevented?" In the sanatoria which now bear his name, light therapy is used extensively in healing the disease. Irradiation is, however, of greater value in pre-tubercular conditions and contact cases. "At Bermondsey Solarium . . . end results have convinced us that many children have been saved from the stigma of tuberculosis by the early and judicious use of artificial light. These . . . if left alone, would undoubtedly have provided a proportion of sanatorium cases."<sup>1</sup>

Prevention.

When the disease has established a footing, actinotherapy becomes the physician's first weapon:—"Tubercular affections of the bones, joints, skin, glands, peritoneum, and the genito-urinary system all respond very favourably to irradiation and the results have been so good that this should be the treatment of choice."<sup>2</sup>

The best results are obtained in superficial forms of the disease:—"There are two groups of cases, namely (1) lupus and (2) adenitis with abscess formation and skin involvement—both groups so unresponsive to other forms of treatment—which have benefited very greatly by light therapy, and the continued good results in these cases confirm the value of artificial light treatment."<sup>3</sup>

Adenitis.

"A study of these charts will show that good results are obtained in each of the three groups. Perhaps results are more striking in the cases that have a duration of from eight to twelve months. It may be said that this is so, because the disease has in these cases run its course. The difference, however, is so slight in comparison to the uniformly good results in all the groups that we can hardly avoid the conclusion, that we have in the quartz mercury-vapor lamp a therapeutic agent that is of great value. So striking are these results, that we may almost put the burden of proof on those who think the results are merely coincidental."<sup>4</sup>

Intestinal.

In "surgical" cases, where bones and joints are involved, orthopædic treatment in an institution is most effectively assisted by ultraviolet therapy. "Since even in the high mountains there are times when the sun for days and even weeks may go on strike. . . I have used for some years the quartz lamp as a substitute for sunlight, and have the impression that we have in it a very efficient therapeutic agent."<sup>5</sup>

"Formerly it was thought that ultraviolet irradiation was contraindicated in pulmonary tuberculosis, but recently opinion has veered to the belief that, if properly administered, it is beneficial, i. e., with appropriate and judicious dosage."<sup>6</sup>

Pulmonary.

The commentary of Dr. Bach<sup>7</sup>, the physician who introduced general irradiation with the quartz lamp, still holds good:—"It is primarily the organism itself which possesses powers by which healing is

<sup>1</sup> Toussaint, C. H. C., and E. J. MacIntyre. *Brit. Jnl. Phys. Med.*, November, 1931. <sup>2</sup> Furniss, A. *Med. Officer*, March 5th, 1930. <sup>3</sup> Cox, G. L. 2nd Report of Lancs. C.C. Central Tuberculosis Officer, 1928. <sup>4</sup> Brown, Lawrason & Sampson, Homer L., *Intestinal Tuberculosis*, 1926, Diagnosis and Treatment. <sup>5</sup> Bernhard, O. "Light Treatment in Surgery," 1926. <sup>6</sup> Alexander, J. B. *Brit. Jnl. Phys. Med.*, November, 1931. <sup>7</sup> "The Alpine Sun Quartz Lamp" (1931).

effected, and like all other remedies, natural and artificial light baths can only serve to stimulate and assist these natural powers... Where they are capable of improvement, success will be obtained by natural and artificial light baths and climatic cures in the treatment of all forms of tuberculosis superior to those yet achieved by any other method."

Tuberculosis of the skin has healed in a large percentage of cases after exposures to the ultraviolet from various sources. Extra-pulmonary tuberculosis in many forms has yielded to treatment with artificial energy as well as with sunlight. These results have been so clear cut in a large number of cases that there is no doubt about them. A knowledge of the biological effects of radiant energy and their clinical application is now essential to the practitioner of medicine.<sup>1</sup>

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<sup>1</sup> Laurens, H. The Physiological Effects of Radiant Energy, Chemical Catalog Co. (1933).

# INFRARED RAYS

"In my considered judgment, no practitioner can afford to neglect infrared therapy. He will at least find it a great adjuvant to treatment in a great variety of cases."<sup>1</sup> Infrared rays produce local vasodilation and hyperæmia, with increased circulation of blood and lymph. This improves the nutrition of the cells, with increased metabolism and elimination. The rays stimulate phagocytosis, as well as the oxidation and elimination of disease deposits (oxylates, phosphates, urates, etc.) in the tissues. The Sollux Lamp radiation penetrates far and evokes these reactions deep in the tissues.

The Sollux Lamp combined with the Alpine Sun gives a radiation similar to natural sunlight and with the advantage that its composition can be varied at will. The infrared rays act as "carriers" to the ultraviolet energy by bringing the skin into fit condition to react. Used alone, general infrared irradiation is the ideal method of warming the body and improving the condition of shock.

By regional infrared radiation of the thorax, relief is obtained in acute respiratory conditions such as bronchitis, pleurisy, and in the late stages of influenza. "In the acute stages of bronchitis or in pulmonary congestion from any cause, light applications to the chest afford a more prompt relief of chest pain and respiratory distress than any other measure with which I am familiar."<sup>2</sup> Applied to the lumbar region, this regional treatment will temporarily alleviate an attack of lumbago and prepare the way for regenerative ultraviolet therapy. For nephritis, "There is probably no other condition in which the systemic use of external heat may have such specific early consequences."<sup>3</sup>

In any disease characterized by local "inflammation," pain, œdema, acute catarrh, focal infrared treatment will give valuable aid in effecting relief of pain and resolution of the condition.

"Boils and carbuncles (if treated early enough) can be abated. Otherwise, the treatment expedites the evacuation of pus and relieves pain promptly. . . . I know of no treatment for which the patient will be so grateful."<sup>4</sup> Other local infections—abscesses, whitlows—yield in similar manner to prompt treatment. Focal irradiation also quickly relieves the irritation and swelling of insect bites.

"Sprains afford spectacular results and my experience has taught me that if treated within the first forty-eight hours, early relief of pain and complete restoration of function will result after four treatments."<sup>4</sup>

Infrared radiation is of great adjuvant value in trauma. "Fractures into or about the joints, such as Colles' fracture or 'Pott's fracture, accompanied by swelling at the site of the fracture and particularly by swelling of the hand or foot, are best treated by radiant heat followed by massage. This treatment should be given within a few days

General  
Irradiation.

Regional  
Irradiation.

Bronchitis.

Lumbago.

Nephritis.

Focal  
Irradiation.

Boils.

Sprains.

Fractures.

<sup>1</sup> Troup, W. A. "Therapeutic Uses of Infra-Red Rays" (1933). <sup>2</sup> Titus, E. C. "Some Uses of Light in the Treatment of Disease." <sup>3</sup> Pemberton, R. *Jnl. Amer. Med. Assn.*, October 8th, 1927. <sup>4</sup> Troup, W. A. *Brit. Jnl. Phys. Med.*, May, 1934.

after reduction of the fracture. Similar means of treatment are valuable also in contusions."<sup>1</sup>

**Neuralgia.**

The practitioner can give pronounced relief to patients suffering from acute nervous pains: neuralgia, neuritic conditions, migraine, sciatica. In these and many other disorders, various forms of light therapy are valuable when applied in sequence. Focal infrared relieves the acute pain, and is followed by ultraviolet radiation, applied both locally to regenerate the affected tissues and generally for restoring tone.

**Rheumatism.**

Rheumatic pains of all types are relieved by infrared radiation: acute fibrositis, torticollis, arthritic joints. "Infrared rays . . . are of value especially in relieving pain and stiffness and improving circulation. In conjunction with massage . . . infrared rays are effective in dispersing the nodules and thickenings of fibrositis."<sup>2</sup>

Specialists in ear, nose and throat diseases have developed the use of infrared radiation to a great extent, and every practitioner will find a Sollux Lamp invaluable for these conditions alone.

**Otitis media.**

Dr. Oeken's<sup>3</sup> 250 cases of otitis media all cleared up within two to five days without operation, without relapses, and with full preservation of hearing. "The complaint for which I use the Sollux Lamp most frequently is otitis media. . . For the relief of pain in sinusitis, the Sollux Lamp is also useful. . . In acute laryngitis, as well as employing steam inhalations, etc., I always employ the Sollux Lamp to each side of the neck alternately."<sup>4</sup>

**Rhinitis.**

In acute coryza, "radiant light is an effective adjuvant, producing a deep hyperæmia, which relieves the sense of fullness and congestion about the nasal mucosa and sinus openings, enhances local nutrition, and gives the patient general relief."<sup>5</sup>

"The application of infrared irradiation . . . in the treatment of septic processes generally, should be the method of choice. If it is instituted early, and not adopted as a last resource, such conditions rapidly clear up."<sup>6</sup>

**G. U. Conditions.**

In certain genito-urinary disorders, infrared radiation decided utility. For prostatic lesions "radiant light and heat over the prostatic and its adnexa, are valuable and efficient. Diathermy balances the circulation and light withdraws the blood to the surface and releases vascular stasis and spasm. Thus each corrects the indolence."<sup>7</sup>

The pain and swelling present in acute orchitis and epididymitis likewise subside under focal infrared treatment.

"The dysmenorrhœa of puberty is frequently ameliorated; under the influence of combined irradiation, infrared with ultraviolet, periods have become regular and free of pain. . . In conditions of perimetritis and periannexitis, resulting from childbirth or abortion, the action of infrared is really remarkable; the pain, whether acute or continuous, diminishes or disappears entirely; the colic spasms of genital origin which frequently accompany the pain are reduced, and the various disturbances due to sympathetic disequilibrium disappear as improvement continues."<sup>8</sup>

<sup>1</sup> Council of Phys. Therapy, *Jnl. Amer. Med. Assn.*, July 7th, 1934. <sup>2</sup> B. M. A.: Report of Arthritis Committee, 1933. <sup>3</sup> *Therap. Halbmonatshft*, December 1st, 1920. <sup>4</sup> Thacker-Neville, W. S. *Brit. Jnl. Phys. Med.*, February, 1933. <sup>5</sup> Hollender & Cottle. "Physical Therapy" (1926). <sup>6</sup> Troup, W. A. *Brit. Med. Jnl.*, August 25th, 1934. <sup>7</sup> Titus and Pedersen, *Lancet*, October 10th, 1931. <sup>8</sup> Francillon-Lobre. *Ann. Inst. Actinologie*, March, 1934.

# FOCAL ULTRAVIOLET THERAPY

The vitalizing effects of ultraviolet rays are also used for healing focal lesions, where trauma may have broken down tissues or chronic infections settled. The regenerative local reaction gives new vitality to the cells of skin and tissues, glands and membranes; stimulates phagocytosis, accelerates the elimination of toxins and the restoration of normal function.

Focal treatment demands a more advanced technique than general irradiation. It necessitates the use of a Kromayer Lamp. In this apparatus the mercury arc is concentrated into the smallest possible compass and water-cooled during operation, so that the rays can be applied in direct contact to the skin or, by fitting suitably shaped quartz "applicators" to the accessible membranes.

"Although requiring careful handling, the amazing direct bactericidal power of the lamp, the ease and rapidity with which any desired degree of erythema can be obtained, and the facility for getting the direct effect of the rays on any part desired, make it the most valuable apparatus for local treatment. The quartz applicators make treatment in otherwise inaccessible parts possible."<sup>1</sup>

The indications for focal irradiation are numerous, particularly in ear, nose, and throat work, skin treatment, and surgery.

Four to six repetitions of a focal reaction on the tonsils will largely assist in clearing up the focal sepsis which is often a factor in rheumatic conditions, neuritis, arthritis, and toxæmia. Chronic diphtheria carriers return negative swabs after one or two applications of this treatment. At St. Mary's Hospital, local and general irradiations combined prove effective in treating glossitis. Cervical adenitis, whether simple or tubercular, responds in a manner that suggests a specific reaction. The common cold and other direct infections in the nose and throat can usually be aborted in their early stages. An adapted technique affords prophylaxis to hay fever subjects, and symptomatic relief can be given in cases of atrophic rhinitis.

In skin treatment, boils, chilblains, erysipelas, and ulcers are the more common of many conditions for which the Kromayer Lamp is the routine measure wherever its value is utilized. In cases of ring-worm, focal irradiation has obvious advantages over epilation by X-rays or thallium acetate.

Infected wounds and sinuses are instances of the assistance which surgeons find from due use of focal actinotherapy. "At the Michelin Surgical Clinic, Dr. P. Lamariee treats nearly 2,000 cases of wounds and burns each year by light therapy, with rapid and excellent results."<sup>2</sup> In all its indications, the focal irradiation is most effective when combined with general ultraviolet therapy for its tonic action, and with other treatment as appropriate to the case.

The  
Kromayer  
Lamp.

Ear, Nose  
and Throat  
Work.

Skin.

Surgery.

<sup>1</sup> Weinbren, M. *Brit. Jnl. Tb.*, October, 1927. <sup>2</sup> *Bull. Chir. Accidents du Travail*, April, 1930.

Detailed literature on the Kromayer Lamps and the indications for focal irradiation is freely available on request to Hanovia Chem. and Mfg. Co., Newark, N. J.

## ACTINOTHERAPY IN PRACTICE

The basis of a successful practice lies in the number of patients who feel that they have been turned from disease back to health. The achievement of success in this regard depends not only on the physician's skill and training, but very largely on his fighting instincts. Healing is warfare, and wars are not won at a stroke. No drugs, no sera, no actinic rays will of themselves abolish a disease and leave the patient healthy. The *therapia magna sterilisans* is an illusion as chimerical as the philosopher's stone. What will ultimately decide the issue are the patient's own powers of resistance and recuperation. These are the physician's fighting troops; he is their director. They must be mobilized, encouraged, reinforced as necessary.

Some physicians may still assume that they can maintain a successful practice without availing themselves of physical methods, including actinotherapy. This is "an impossible assumption."<sup>1</sup>

Others utilize physical methods in a vicarious way. They refer their patients to outside institutions, clinics, or assistants. Unless the physician has a close understanding with the operator, prescribes the requisite dosage or reaction, knows that due skill and adequate equipment are available to fulfil his prescription, and ensures that the proper reaction is obtained, he loses control over the technique, the patient's reaction, and the results.

In prescribing drugs he is bound to write an exact prescription, which he knows will be accurately dispensed by a qualified chemist with a training covering several years' theoretical and practical work. Yet many a physician, in prescribing light therapy, leaves full discretion to an operator whose training may be limited to a period of months and who may have at his disposal apparatus which is far from adequate.

It is quite likely that the patients will decline to take treatment; this was the experience of a user who writes:—"About this time last year, when I started practice in this developing district. . . . I had to look around for a clinic where I could send my patients for sun treatment. The majority of such patients refused to go to such a clinic for the simple reason—and quite a natural one—that they could not possibly get it under my direct supervision."<sup>2</sup>

### A Personal Matter.

A physician who once masters actinotherapy will realize it as a powerful addition to his armamentarium. When he makes adequate use thereof he will find it indispensable to have his own lamps, to know their power, and to have light treatment administered, if not always by himself personally, at least under his supervision. "Actinotherapy is most certainly a general practitioner's work."<sup>3</sup>

At the outset this means expenditure of time, energy and money. In none of these directions are the demands excessive.

<sup>1</sup> See page 2 of this booklet. <sup>2</sup> Private letter from K. V. N—, M. B., B. S. (Branch President's address). *Brit. Med. Jnl.*, June 28th, 1930. <sup>3</sup> Stratford, H. (B. M. A.

In a busy practice, time is possibly the most important consideration. It is common experience that actinotherapy proves a help towards better organization of the practice and more economical use of time. As actinotherapy is naturally administered at the consulting room, patients who otherwise expect visits at home come in for treatment and so reduce demands on the practitioner's own time.

Points to Consider.

Definite study is undoubtedly necessary for good results, but no special post-graduate course is needed. There are many good books available which will give all the guidance needed by a qualified medical practitioner when starting; he will very soon master the technique with sufficient confidence to vary it according to the requirements of each individual case, and to prescribe dosage with full understanding when he entrusts the administration to a competent assistant under his own supervision.

The question of accommodation deserves mention. Light treatment can be administered either in the consulting room itself or in an annex. A small room, say 10 feet square, would be sufficient to accommodate the apparatus, the couch, screens for disrobing, etc. At least two electric power outlets should be provided; one of these (with a 15 ampere fuse in circuit) is sufficient to operate a thoroughly efficient installation.

What Apparatus is needed?

In this brief review of clinical evidence, questions of equipment and methods of treatment have arisen as incidentals. Summarizing the scattered references to technique, it will be noted that there are two complementary forms of actinotherapy, i. e.:—

**Ultraviolet irradiation**, for tonic and bio-chemical effects.

**Infrared irradiation**, for decongestive and analgesic effects.

Either form may be administered in different ways, i. e.:—

General irradiation (whole body)

Regional irradiation (selected areas)

Focal irradiation.

Ultraviolet rays are chiefly used in the form of general irradiation, whilst infrared rays are more frequently applied focally.

Ultraviolet and infrared rays are often used in combination, yet in every case each supplements the other, and it is essential to utilize separate generators for the two groups.

It is plainly necessary that the apparatus used should fulfil certain essentials. It should, for instance:

Operate from the available electric supply without necessitating special wiring.

Be sufficiently powerful to produce adequate results with minimum demands on the practitioner's time.

Always be ready for instant use.

Require the minimum of attention, renewal or upkeep.\*

\* It is further desirable, if not essential, that apparatus used in a consulting room or clinic should be free of smell, noise, splutter, or any other feature which might alarm nervous patients.

For ultraviolet radiation in the form of systemic or regional light baths, air-cooled quartz lamps are everywhere adopted as the most effective and convenient sources. They are the only sources which fulfil the requirements detailed above.

"The lamp which I recommend is the mercury vapour lamp. Its output is rich in ultraviolet rays but poor in heat rays. It gives off no fumes. It is a clean lamp. It works automatically, needing very little attention."<sup>1</sup>

Focal ultraviolet radiation necessitates special lamps (Kromayer water-cooled types), which can be used in direct contact with the skin or membranes.

For infrared radiation, the most effective generators are the Sollux incandescent bulb types, because they produce the wavelengths which have deepest penetration into the subcutaneous tissues.

For general practice, therefore, the most convenient actinic source will be one which combines an air-cooled quartz lamp and a full power incandescent lamp.

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<sup>1</sup> Cumberbatch, E. P., *Brit. Med. Jnl.*, July 14th, 1928.



